CHRONOLOGY

1831. Capt. William Reid began hurricane studies on the island of Barbados.
1838. Reid published his laws of storms.
1847. Reid established display of signals at approach of storms.
1870. Father Benito Viñes became director of Belen College and inaugurated a hurricane-forecasting service, for Cuba.
1870. February 9: United States Congress made appropriations for a national meteorological service.
1873. August 6: Daily reports from Cuba and other West Indies islands first received.
1875. September 11: Father Viñes issued first hurricane warning.
1876. Set-back in development of hurricane-warning service due to discontinuance of reports from West Indies.
1881. West Indian reports again suspended; legality of expenditures outside of United States questioned.
1889. January 1: Meteorological service for Cuba organized under direction of Naval Observatory of Cuba.
1898. First reorganization of hurricane-warning service to protect American fleet during Spanish-American War; bill for providing funds submitted to Congress June 16; approved July 7.
1898. July 25: First observing station opened at Kingston, Jamaica, which was made headquarters of hurricane-warning service.
1899. February 1: Headquarters of forecasting service transferred to Habana.
1902. Forecasting service for hurricanes transferred from Habana.
1902. National Meteorological Service of Cuba established.
1919. June 1: Hurricane-warning center for Puerto Rico established at San Juan.
1935. July 1: Second reorganization of hurricane-warning service; service transferred from Washington to centers at Jacksonville and New Orleans.

EFFECT OF THE ATLANTIC OCEAN ON TEMPERATURES IN EASTERN UNITED STATES AS SHOWN BY TEMPERATURE-WIND ROSES [1]

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[5814 Thirty-second Street NW., Washington, D. C., March 1935]

In the preparation of a thesis concerned with some effects of the Atlantic Ocean upon the climate of eastern United States, a study was made of the effectiveness of the ocean in moderating temperatures at various stations. The decrease in temperature ranges along the Atlantic coast is obvious from maps of the average daily range of temperature (figs. 82, 83, and 84, p. 25, *Atlas of American Agriculture*, Pt. II, Climate, Sec. B, Temperature, Sunshine, and Winds, United States Department of Agriculture, Washington, D. C., 1928); there is a very much smaller daily range along the immediate seashore than inland. The Brownsville region, southern tip of Florida, Cape Hatteras and Cape Cod have in spring, summer, and fall the small daily range of 9° to 12° F. A comparison of the highest and the lowest recorded temperatures (fig. 3, p. 7, and fig. 6, p. 8, *Atlas of American Agriculture, loc. cit.*) shows a pronounced moderating effect of the Atlantic Ocean along the coast, but indicates that this does not extend westward beyond the Appalachian Mountains.

To show, by some quantitative and graphical means, the influence of winds from the direction of the Atlantic Ocean upon the temperatures of coastal and inland stations, temperature-wind roses were constructed: Data used for these roses were the 8 a. m. readings of temperature and wind-direction published on the Washington daily weather maps. Seventeen stations in eastern United States were chosen, and data for 20 years (1906–25) for the months of January and July were compiled and averaged. For each station the following data were obtained: (1) Average 8 a. m. temperature; (2) frequency of winds from the cardinal and semicardinal points; (3) average temperatures with winds from each direction; (4) the departure, from the 8 a. m. average temperature, of these average temperatures for each wind-direction.

From this information the roses were constructed, as illustrated by figure 1, the January and July roses for Boston: The center part is a simple frequency wind rose. On the 620 January days, Boston had a northwest wind 149 times and a southeast wind 23 times. At a convenient distance from the center of the rose (the same distance for all directions and for all roses), a point was chosen as a zero from which to plot temperature departures; minus departures were represented inside the zero point, and plus departures outside. A polygon, which is a perfect octagon, connects the zero points and represents the simple average 8 a. m. temperatures for the 620 days. A heavy line connects the points that represent the departures; it forms the temperature-wind rose, a distorted polygon. The amount and kind of distortion represents the effect upon temperature of winds from the different directions; on the Boston January rose, for example, the mean departure with a northwesterly wind is minus 7.7°, and with a southeasterly wind, plus 7.5°.

Unfortunately it is almost impossible to make a correction for the different latitudes from which the winds come; southerly winds usually bring warmer air, and northerly winds colder air. The greatest interest is in winds from easterly directions, as the purpose of the roses is to measure, if possible, marine influence. Local conditions of topography will affect almost every station; Albany, for example, has a very decided minus departure in winter with southeasterly and easterly winds as well as with northeasterly winds, since easterly winds bring colder air from the nearby highlands.

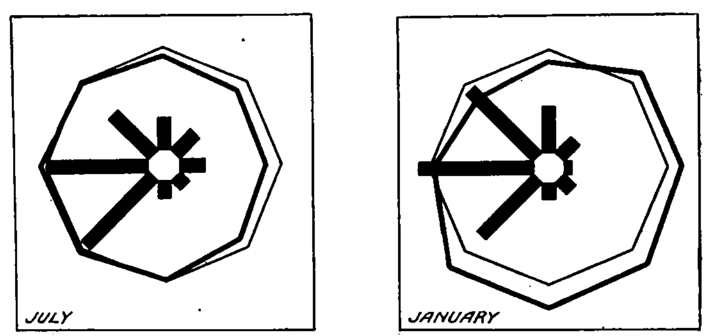

FIGURE 1.

These temperature-wind roses were placed on a map of the eastern United States in their respective positions. Figure 2 shows the roses for January so placed; for purposes of better reproduction, the zero polygons have been changed to broken lines. The distortion of the solid-line polygons indicates that departures from the average are greatest along the New England coast. The roses very clearly show the plus departures with easterly, southeasterly, and even northeasterly winds. This plus departure with an easterly wind in January does not appear at

[1] A part of a thesis submitted to the Faculty of Clark University, Worcester, Mass., June, 1930, in partial fulfillment of the requirements for the degree of master of arts in the department of geography.